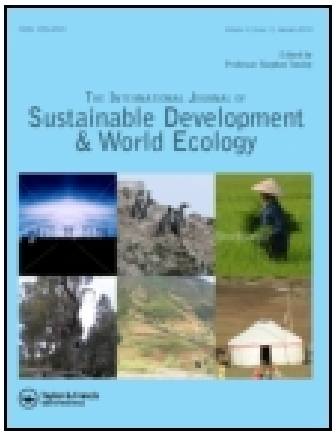

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Recent decades have seen significant steps in the longstanding scientific, philosophical and political debates concerning the relationship between society and nature towards a more 'human-in-nature' view in biodiversity conservation. This progress has been reflected in both prominent scientific publications and several policy documents. However, the recent resurgence of 'protection' paradigms and the persistence of human practices undermining ecosystem functions on which human existence depends reveal that human and natural systems frequently continue to be treated separately in conservation practice and conventional scientific and policy discourses. Using insights from the field of political ecology and from research on social–ecological systems, and following a grounded theory research approach, we identify the critical barriers to the adoption of a 'human-in-nature' view in Greek biodiversity conservation. In particular, the analysis of 63 in-depth interviews with a variety of state and non-state stakeholders acting at several governance levels revealed as main barriers the lack of an integrative perspective on humans and ecosystems, scale mismatches between social and ecological systems, the underestimation of the heterogeneity of social groups, and the understanding of the reliance on the market as the main solution to biodiversity loss. We argue that steps towards ensuring environmental justice as well as socially inclusive and adaptive governance processes should embrace an understanding of both the dynamic nature of ecosystems and the power-laden character of the socio-economic systems involved in biodiversity conservation in order to create the preconditions for the emergence of social–ecological sustainability and ultimately for a 'human-in-nature' view.

Keywords: protected areas; political ecology; social–ecological systems; power; scale; adaptive governance; sustainability

Introduction

Since the late nineteenth century, the leading conservation strategy has been the establishment of protected areas (PAs) (Adams et al. 2004). From the distinctions of that period between the romantically idealistic notions of the 'wilderness' movement and the more pragmatically based considerations of the 'wise use' movement, the concepts of conservation and utilization have been central in conservation discourses (Kalamandeen and Gillson 2007). These different views have always reflected a more general wavering between idealistic representations of nature as an ideal entity in equilibrium and mechanistic representations of nature as a machine supplying services for human benefit (Foster 2002). However, in practice, these different philosophies have often coexisted. Thus, the history of the establishment of PAs reflected an ideology of strict protection based on the preservation of wilderness according to aesthetic and moral criteria (Thiele 1999), but at the same time it has been linked with economic and development incentives and displacement of indigenous people (Abakerli 2001).

Recent decades have seen advances in the longstanding scientific, philosophical and political debates concerning the relationship between society and nature towards a more 'human-in-nature' view in biodiversity conservation. In scientific terms, the necessity of interdisciplinary approaches towards the management of interconnected social and ecological systems has been acknowledged to cope with the challenges of global environmental change (Berkes 2004; Olsson et al. 2007; Collins et al. 2011). This has been related to significant changes in ecological concepts: growth of ecosystem approaches and advocacy of participatory conservation (Bradshaw and Bekoff 2001; Brown 2003b; Berkes 2004) along with a change in the perception of ecosystems as dynamic systems across scales (Scoones 1999; Folke et al. 2010). At a policy and governance level, there are signs of the need to acknowledge the consequences of human actions to the environment and the connection between biodiversity conservation and livelihood needs, both in international agreements and in global studies (Berkes 2007; Convention on Biological Diversity 2010).

These changes, at all levels, indicate an emerging recognition – direct or indirect – of the fallacy underlying many natural resource policies that human and natural systems can be treated separately (Folke et al. 2007). Nevertheless, this recognition has not often been reflected in conservation practice and conventional scientific and

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policy discourses. Significant manifestations of the latter can be found in the resurgence of 'protection' paradigms (Wilshusen et al. 2002) recalling the wilderness myth, in the persistence of conflicts between non-sustainable development and conservation (Apostolopoulou and Pantis 2010) and of human practices exacerbating a biodiversity crisis undermining ecosystem services on which human existence depends (Brooks et al. 2006; Egoh et al. 2010; Reed et al. 2011).

The history of conservation policy in Greece is a typical case of treating ecological and social systems independently. Replacing the concept of untouched wilderness with that of supervised human activity surfaced in the late 1980s. Until now, despite the significant proliferation of PAs, biodiversity conservation has been stigmatized by absence of interdisciplinary approaches, contradicting and superficial initiatives to combine sustainable development and conservation, and minimal integration of social and ecological sustainability (Apostolopoulou and Pantis 2009, 2010; Apostolopoulou 2012; Apostolopoulou et al. 2012).

A 'human-in-nature' view,[1] as defined in this paper, builds on the insights of political ecology and research on social–ecological systems (SESs) and perceives the interconnection of social and ecological systems, as well as the need to reconcile societal needs and environmental justice with biodiversity conservation and sustainable management of natural resources, as interlinked issues. We aim to investigate the paradigms and conceptual frameworks that guide current biodiversity policy and governance in order to identify the main barriers to the adoption of a 'human-in-nature' view in biodiversity conservation within the Greek context. We also discuss potential bridges for surmounting these barriers, thus contributing to a shift in both theory and practice towards 'human-in-nature' approaches. Our analysis focuses both on scientific and policy aspects, by investigating the main ideas and practices characterizing biodiversity conservation as a practice of human organization.

Nature–society relationship

Biodiversity governance by regulating the access of people to nature highlights the need for interdisciplinary approaches. However, despite efforts, there is a lack of 'on-the-ground' initiatives to combine ecological challenges with the role of policies, politics and people and vice versa (Campbell et al. 2009; Heller and Zavaleta 2009). Attempts to foster an open dialogue between the interdisciplinary fields of political ecology and research on SESs (e.g. Peterson 2000; Lebel et al. 2006; Armitage 2008; Michon 2011) could contribute towards this direction.

The use of the term 'social–ecological' system was originated as a way of highlighting the integrated concept of 'human-in-nature' and stressing the artificial distinction between ecosystems and human society (Folke et al. 2010). SESs often comprise complex matrices with groups of resource users linked across scales through multi-level governance arrangements (Janssen et al. 2007) whose actions are central to understanding ecosystem capacity to support natural resources. The latter identifies humans as drivers of ecosystem change (Folke et al. 2010), although highlighting that economic and social relations are not only linked to local patterns, but also depend on the capacity of other ecosystems to sustain them (Folke et al. 2005). Moreover, the concept of resilience has been characterized as a profound shift in traditional perspectives to a more dynamic viewpoint aimed at sustaining and enhancing the capacity of SES to adapt to uncertainty and change (Adger et al. 2005).

Crucially, the outcomes of biodiversity conservation are embedded in the political economy of conservation benefits and resources use (Adams and Hutton 2007), whereas they are strongly influenced by the dominant environmental narratives and beliefs (Forsyth 2008). Defining policy objectives in terms of protecting local livelihoods, as well as addressing socio-economic impacts of conservation, requires issues related to power relations and social and environmental justice as well as to the politics of scales to be placed at the core of policy analysis (Swyngedouw and Heynen 2003; Adams and Hutton 2007). Issues of distributive and procedural justice are neither satisfactorily discussed in the resilience literature nor comprehensively addressed by the existing analytical frameworks (Nelson et al. 2007). Political ecology by expanding ecological concepts to respond to the inclusion of economic, cultural and political activities (Greenberg and Park 1994) underlines the importance of uncovering how particular forms of socio-economic organization influence environments and our understanding of ecological processes and problems (Loftus 2009). Ecological systems are not conceived as passive recipients of human actions, as their reaction becomes a significant factor in the human–environment relationship and environmental change an integral part of social, economic and political processes (Nygren and Rikoon 2008).

When biodiversity conservation is viewed through the lens of political ecology and SESs, the analytical focus is shifting to the interface between policies, dominant ideologies, socio-economic structures and processes, drivers of environmental change and relevant social–ecological change by unravelling which policies enhance whose ability to adapt, learn and become empowered.

Methods

The current context of conservation policy in Greece

The means of nature conservation most utilized in Greece has been established PAs mainly on state-owned, but also on privately owned, land with some cases including both types of land with complicated property rights. Since 1985, the conservation and management of Greek natural areas has been shared between the Ministry for the Environment, Physical Planning and Public Works (MEPPW)[2] and the Ministry of Rural Development and Food. Today, the main responsibility for PA selection and designation lies to the

Ministry of Environment, while since 2011 partly also to the Regions. For PA management, several institutions with overlapping jurisdictions and responsibilities exist, including 28 management agencies (covering 94 Natura sites), the Forest Service and Forest District Offices, directorates of PA coordination at the level of decentralized administration, public administration or other legal entities, regional and local authorities, as well as Municipal enterprises, NGOs, development companies and research institutes.

Despite the major increase in the number of PAs during the last decade, specific management measures are applied only for a few species; the official management plans are really few, while local community involvement remains limited (Apostolopoulou and Pantis 2009). Overall, there is, in practice, a clear priority for development and economic plans without taking the necessary measures for nature conservation, while, despite the many unofficial drafts, an official biodiversity strategy has yet to appear (Apostolopoulou and Pantis 2009, 2010). These trends are especially crucial during the economic crisis where a clear anti-environmental shift is ongoing (e.g. Greek law 3986/2011; Greek law 4062/2012).

Data collection and analysis

Despite the fact that we had a number of specific theoretical considerations regarding our research questions, we adopted a grounded theory approach (Glaser and Strauss 1967; Strauss and Corbin 1998) in order to take into account the interpretations of research participants and the variability across different empirical settings. Thus, the interview structure was flexible based on general questions (see also Apostolopoulou and Pantis 2010) aiming at exploring the interviewees' understanding of the relationship between society, nature and current conservation policy and governance in Greece. The sample was selected according to the 'theoretical sampling' method, a strategy of gradually deciding the selection of empirical data during the process of data collection and analysis. The criterion for judging when to stop researching a certain category was based on the category's 'theoretical saturation' (Strauss and Corbin 1998). We first interviewed state officials on a broad with array of topics relevant to our research subject and then, according to data analysis, we gradually selected the interviewees whose input was necessary in order to cover the emerging core categories (e.g. for developing the properties of the category 'market as the main solution against biodiversity loss' interviews with economic actors proved to be necessary). In order to select the specific interviewees, we also used purposeful sampling (see Apostolopoulou and Pantis 2009, 2010).

Between October 2006 and January 2008, we conducted 63 face-to-face, in-depth interviews with a variety of state and non-state actors from different governance levels (Table 1) involved in Greek biodiversity conservation. The interview length ranged from 80 to 120 minutes, and all interviews were recorded in addition to parallel extensive note taking. The empirical material was then transcribed and labelled with a coding scheme combining open, axial and selective coding (see Apostolopoulou and Pantis 2009). The data analysis process underpinned further analytical elaboration to identify the barriers and discuss the bridges to adopt a 'human-in-nature' view in biodiversity conservation (Figure 1). We also analyzed all relevant documents, such as Greek laws and EU Directives, environmental studies and policy reports. In order to use empirical research as a start for a broader discussion, the findings of analysis have been linked with relevant broader discussions in the scientific literature. This is in line with the focus of coding in grounded theory which is based on the opinion of the individual interviewee, but also on the core emerging concepts which can guide researchers from 'description to conceptualization and from the more specific to the general or abstract' (Strauss and Corbin 1998, p. 88).

Results and discussion

Barriers to the adoption of a 'human-in-nature' view in Greek biodiversity conservation

Lack of an integrative perspective on humans and ecosystems

In this section, we focus on the civic epistemology of Greek biodiversity conservation by investigating the way that conservation policy-relevant knowledge is being produced, validated and used by the political world (Miller 2005).

Research participants explained that the Greek state had diachronically played a dominant role in the designation and implementation of biodiversity policies and in the production and use of policy-relevant knowledge. They highlighted that site selection, until 1992, followed the idea to merge scenic beauty with historical values and has not been characterized by a systematic ecological evaluation (see also Papageorgiou and Kassioumis 2005). Moreover, interviewees participating in the selection and mapping of Natura 2000 areas argued that, although scientific criteria were applied, site selection was not based on the principles of systematic conservation planning (see also Dimitrakopoulos et al. 2004). Indicatory is the fact that a significant part of Greek biodiversity and especially important endemic species are missing from the appendices of the Habitats Directive indicating the limited participation of Greek authorities in the process, as representatives of state administration confirmed.

Interviewees explained that the almost total absence of official management plans, the significant gaps in both legislative documents and scientific studies for PA designation and the limited integration of biodiversity into other policy sectors resulted in biodiversity conservation measures mostly at species level or only within PA boundaries. It was widely stated that the majority of funded projects focus on the management or monitoring of single species, related either to specific legal obligations or to the targets of a LIFE-Nature project (e.g. the 33.5% of LIFE-Nature

Table 1. Our sample of interviewees.

Stakeholders involved in Greek biodiversity governance	Number of interviews
Central administration	
Ministry of the Environment, Energy and Climate Change	6
Ministry of Rural Development and Food	4
Ministry of Development	2
Ministry of Economics	1
Ministry of Tourism	1
National Center for the Environment and Sustainable Development	1
Council of the State	1
Total	16
NGOs	
World Wide Fund for Nature Greece	2
The Sea Turtle Protection Society of Greece	1
Hellenic Ornithological Society	1
Hellenic Society for the Study and Protection of the Mediterranean monk seal	1
Mediterranean association to save the sea turtles	1
Hellenic Society for the Protection of Nature	1
Pan–Hellenic Network of Ecological Organizations	1
Hellenic Society for the Protection of the Environment and the Cultural Heritage	1
Total	9
Management agencies and local administration	
Management agencies	14
Municipalities and Regions	6
Central Union of Municipalities and Communities of Greece	1
Total	21
Other key stakeholders	
Companies providing consulting and assessment services in the field of nature conservation	2
Greek General Confederation of Labor	2
The centre of Athens labor unions	1
Hellenic Federation of Enterprises	1
Pan–Hellenic Federation of Tourism Enterprises	1
Technical Chamber of Greece	1
Total	8
Scientific community	
Universities	5
Scientific institutions	2
Research centres	2
Total	9
Total	63

projects from 1996 to 2006 were targeted only at four species of national importance, see Valaora and Dimalexis 2007). Simultaneously, as state employees and representatives of NGOs argued, the regulation of human activities and anthropogenic drivers of biodiversity change mainly consists of general legislative restrictions and prohibitions with limited control of their enforcement.

Many interviewees, especially researchers, tended to focus on the data needs, the adoption of expert-based and quantitative methods for measuring species distribution and/or ecological status. The latter was linked in many interviews with a tendency to understand socio-environmental interactions as independent from the history of control and access to natural resources, property rights regimes, political and socio-economic structures and processes. Although some interviewees criticized this approach, many of them argued that nature has more or less an 'inherent' balance relegating humans to preserve an ideal 'natural' situation or respect the carrying capacity of ecosystems. Indirect opinions acknowledging the existence of nature–society linkages in a mechanistic way were also expressed. A typical example was the understanding of nature–society relationship through the concept of ecosystem services framed as mainly an economic concept (see also Kontogianni et al. 2010).

As it became evident from data analysis, although the core concepts underlying biodiversity conservation in Greece have evolved over time, the primary conservation strategy remains the establishment of PAs, following the EU requirements. These vary from strict nature protection to conservation by regulating human activities in order 'to conserve, preserve, restore or maintain' (as referred to in legislation and by the interviewees) biodiversity *in situ*. The drawback of this approach is the absence of a more complex view taking into account biodiversity conservation at all biological levels from species to ecosystems and the underlying processes (Lister and Kay 1999, p. 190).

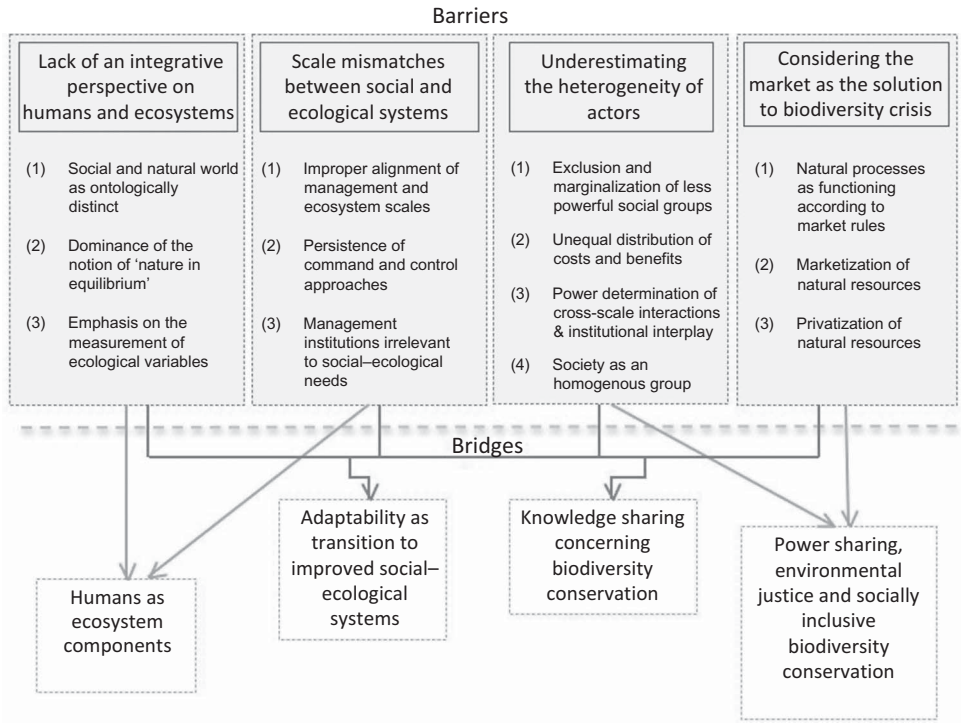

Figure 1. Barriers and bridges to adopting a 'human-in-nature' view in biodiversity conservation. The arrows depict the potential links among barriers and bridges. It is apparent that the barrier–bridge relationship is not 'one to one' implying that a multiplicity of interrelated actions are necessary for a 'human-in-nature' view.

These perceptions and practices are both influenced by and influencing the dominant representations of nature–society relationship. In particular, biodiversity conservation *in situ* has at its core the classic ecological paradigm that species–ecosystems interactions are more or less static and by excluding human activities, ecological systems may be maintained in equilibrium (Wallington et al. 2005). In turn, the dominance of such approaches reproduces the ontological distinction between social and natural domains (see also Haila 2000). Undervaluing the history of Greek landscapes and the present state of biodiversity prevents understanding the social and political construction of resources and revealing the notions of multiple equilibria and cycles (Davidson-Hunt and Berkes 2003). Such perceptions are partly rooted in the educational and philosophical traditions with their entrenched separation between humans and nature (Bradshaw and Bekoff 2001) and in the philosophies of Western science, trapped in specific ontological principles; treating causes separately from results and parts independently of wholes (Levins and Lewontin 1985). Their presence underpins the continuing disciplinary separations between and within natural and social sciences, still dominant in Greek academic institutions and administrative departments. Reflections of this in Greek biodiversity governance appear in the chronic absence of integrative conservation policies, its fragmented regulatory and governance regime, the limited number of multi-objective research projects and institutions, and the contradicting interpretations of state officials concerning policy goals and opportunities for sustainable development, failing to deal with interrelated social–ecological phenomena crossing scales.

Scale mismatches between social and ecological systems

In Greece, a governance regime that treats ecosystems as independent from human organization, and vice versa, is the primary cause of several mismatches between social and ecological scales. Data analysis revealed three major causes of mismatches: the improper alignment of the spatial and temporal scales of management and ecosystem processes, the persistence of command and control approaches and the fact that many management institutions are irrelevant to social–ecological needs. In particular, many interviewees argued that the design principles of management agencies in PAs were not based to the different spatio-temporal species distribution or to the designation of their boundaries according to socio-ecological boundaries. Typical is the following quote from an interviewee:

> The boundaries of management agencies in many cases are non-rational: there are cases where entire villages are included in the protected areas and cases where sites of community importance are excluded because of administrative choices, economic interests or private property rights.

This human 'dominance' over the natural environment also became evident through policy documents and official environmental studies, which are characterized by the absence of a systematic analysis of the spatial patterning of

human–environment interactions. Similarly, interviewees referred to the bureaucratization of state institutions and to the persistence of conventional management approaches impeding developing institutions able to respond to environmental feedback. They argued that the latter influences, and is influenced by, the absence of research projects measuring and understanding scale mismatches. This has created inefficiency, loss of important ecosystem components and culminated in serious disjunction in the SES (Cash et al. 2006; Cumming et al. 2006), increasing its vulnerability to change in the long and short terms. As interviewees explained, this becomes particularly obvious in extreme events, such as the major fires in Greece during the summers of 2007 and 2009 causing the loss of a significant percentage of the Natura 2000 network and local properties.

We argue that the core point here is not that there is a perfect 'match' between governance structures and ecological scales, but rather that the maintenance of rigid hierarchical governance structures, and the inherent contradictions and confusions between top-down, command and control approaches, and collaborative, multi-level arrangements have not been guided by the attributes of the SES, but mainly by the expediency of particular political choices. The focus of political ecology on the historical construction of nature and space (Ekers et al. 2009) and on the discrepancy between real resources and official categories (Bryant and Bailey 2000) offers critical insights for understanding these weaknesses, not primarily as technical problems as were often explained by some interviewees, but as fundamental characteristics of the current socio-economic system. Thus, the structure of administration, the conflicting agendas resulting from an absence of environmental policy integration, the narrowly defined and conflicting objectives and the dominance of vague short-term goals (see also Brown 2003a) are strongly related to dominant neoliberal policies.

Moreover, what proved to be of particular importance is the way that the dominance of static representations of ecological dynamics in Greek biodiversity conservation co-evolves with governance and management arrangements (see also Leach et al. 2007) often leading to what Low et al. (2003) characterize as 'an optimal, one-size-fits-all management system'. The underlying presumption behind this institutional behaviour is that the proposed solutions are appropriate over most relevant spatial and temporal scales and thus that environmental problems are quite linear (Holling and Meffe 1996). Applying these approaches to complex adaptive systems results in several temporal, spatial and functional scale mismatches and fails to embrace the diversity of different local settings and ecosystem complexity (Galaz et al. 2008).

Underestimating the heterogeneity of social groups involved in biodiversity conservation

As the interviews revealed, so far no official process guaranteeing the participation and involvement of all relevant stakeholders during the designation of conservation policies has been consolidated. The typical case proved that several meetings with national level actors are held, resulting in laws that are mere translations of EU directives, or unsatisfactory compromises with major economic and developmental interests. The role of the public is limited to the consultation processes through the Internet, and the extent to which comments are taken into account is unknown as the majority of interviewees stated. Simultaneously, over the last two decades, an expanded role for non-state actors has emerged, sharing responsibilities and partnerships between the state and actors from the private sector and the community, mainly in the context of EU funding schemes (especially Community Support Frameworks or CSFs). As data analysis showed, these governance arrangements have often been guided not by the need for cross-level cooperation and coordination, but by political or economic criteria leading to a power-laden interplay where stakeholders unaffiliated to the dominant political parties or policies are excluded from decision-making processes. It is indicative that many interviewees with leading role in state administration criticized the persistence of party-dominated clientelism and corporatist phenomena.

As an interviewee said, the investigation of the potential inequity of costs and benefits between social groups that governance arrangements and policies produce 'is not even a question of current conservation policies'. This has further been illustrated by the reinforcement of a sense of environmental injustice, despite the establishment of multi-stakeholder agencies in some PAs. As almost all interviewees confirmed, the flawed basis for local participation has often resulted in the progressive failure to promote sustainability and collaboration proving that government's verbal commitment to participation was mostly rhetorical (see also Apostolopoulou and Pantis 2010; Apostolopoulou 2012).

However, the majority of interviewees tended to conceptualize society as a homogenous group leading to a neutralization of the socio-economic, political and cultural characteristics of social groups involved in conservation. This engenders the manifold contradictions, dominant in the perceptions of some interviewees, when trying to determine the nature, scope and implications of community involvement in biodiversity conservation. The latter was also evident when building consensus as a solution to social conflicts by supporting a typical equity in political rights of all members of society, disregarding their real inequality in the sphere of economic influence, was proposed. Interviewees using this term tended to distance themselves from the role of cultural, social and economic factors, class structures, differing values, interests and problem definitions, in determining the purpose and content of multi-level arrangements and partnerships, the participation terms, as well as the inequalities in access to and power over resources.

Underestimating the heterogeneous composition of multi-level governance arrangements proved to be a barrier towards a 'human-in-nature' view, reinforced through

the ways by which resource-dependent or unempowered social groups are marginalized or discriminated against in Greece. In particular, the implications of the dominance of the above perceptions have been evident in situations where local opposition to conservation has been used as an excuse for supporting nature privatization (e.g. Schinias National Park) or to situations where the continuation of harmful activities has been presented as support for local community welfare (e.g. National Marine Park of Zakynthos). Any aspect of caricaturing community as homogenous has led to the same fallacy: undervaluation of the way local practices are shaped by wider socio-economic relations and the degree to which different human practices contribute to biodiversity loss.

We argue that escaping from the contrast between human influenced and natural environments, and the equilibrium view of ecology, requires the contextualization of environmental problems (Haila 2002). Conversely, the dominant conceptualizations of 'civil society' in our interviews, failed to trace the linkages between the practices of specific social groups and broader social and productive relations and to acknowledge the roots and implications of economic and social differentiation within communities, and the resulting diversity of interests (Nygren 2000; Brown 2003a). This significantly affects identification of the social impacts of conservation, and more generally, the environmental dimensions of development (Adams et al. 2004) often implying that conservation is best achieved through market forces coupled with strict private property rights and exclusion of local people. The implications of this approach are evident on the overexploitation of natural resources by partnerships of powerful economic and developmental interests, situation highly apparent in Greece. As Robbins (2004, p. 213) argues to 'the hybridity thesis' of political ecology while powerful institutions and individuals attempt to divide the boundaries between nature and society, they are at the same time allying themselves, building new connections to the non-human world.

Understanding the reliance on the market as the main solution against biodiversity loss

In our analysis, although varying perceptions on the valuation of biodiversity and ecosystem services have been recorded, the vast majority of those have been accompanied by economically dominated perceptions of the relationship between environment and development. An opinion, particularly pervasive among private economic actors and senior officials, was that if the utilization of biodiversity (framed mainly as 'natural resources') incurs costs, then the dynamics of supply and demand will prevent its depletion. This tendency has been expressed in our interviews both through the criticism to the regulatory role of the state in conservation policy, as well as through propositions for the marketization of the landscape and the 'environmental experience', mainly through the active cooperation between park managers and tourist industry. Simultaneously, interviewees often considered environmental economics as tools for the elaboration of 'scientific calculations' of how much the 'consumers' are willing to pay in order to conserve biodiversity in comparison to other 'products' and 'services'. The above opinions were frequently linked in the interviews with privatizing conservation areas (or parts of them) as the most viable and feasible solution for ensuring 'good environmental quality' in Greece.

It is interesting that the interviewees who criticized these approaches supported that these are currently the dominant ones; whereas those who were in favour of them argued that their limited implementation is a weakness of current conservation and environmental policies in Greece. However, the increase in the cooperation between private and public sectors since the 1980s (when local administrations were given the ability to establish municipal enterprises) has not been followed by long-term environmental projects aiming at ecological sustainability or/and biodiversity conservation. Indeed, interviewees from the private-business sector perceived conservation measures as mainly threatening their plans, and the relationship between development and conservation as a matter of priorities influenced by alliances between the state and different interests.[3] Similarly, as our data analysis revealed, private interest groups, as well as politicians, often consider national and mainly EU funds for conservation as resources for indirectly pursuing economic goals.

The mechanistic opinions of some interviewees about valuation of separate natural 'parts' or ecosystem services are strongly connected with the adoption, directly or indirectly, of the ontological commitments of reductionism and the general lack of an integrative perspective on SESs described earlier (Section 3.1.1). Understanding the environment as a Cartesian machine with replaceable parts, and ignoring that environment is dialectically composed, as an ecosystem, often led to the opinion that biodiversity processes can be considered to function according to market rules (Perelman 2003) or that ecological modernization and technological novelty could alone overcome any natural barrier obstructing sustainability (Clark and York 2005).

As Burkett (1999) states, the notion that 'exchange values can and should be "corrected" to fully account for the use values of nature is tantamount to a denial of the basic, irreconcilable contradiction between exchange value and use value – between the material and social requirements of capital accumulation and those of a truly human, social and ecological development'. Such approaches seriously underestimate the dynamic nature of both society and ecosystems and separate economic growth from the natural resources it depends on, obstructing the adoption of sustainable solutions (Folke et al. 2007). Moreover, such approaches contribute, even unconsciously, to promoting myths about inherently 'bad' or 'good' local people and along with the perception of recreation as a commercial product, and the domination of aesthetic criteria as appropriate for the 'evaluation' of biodiversity benefits, lead to the overexploitation through tourism of many conservation areas of the 'developing' (Neumann 1998) as well as the developed world, causing the degradation of traditional economies (McCarthy 2002).

The above-mentioned issues are not only the characteristics of the Greek case. Understanding the market as solution to biodiversity loss has been linked with the benefits of private property rights over natural resources (Mukhopadhyay 2005) and is a rather dominant trend towards the neoliberalization of biodiversity conservation (Igoe and Brockington 2007; Büscher et al. 2012). The implications of this policy discourse are extremely significant at the moment. In particular, the economic crisis in Greece has resulted, *inter alia*, to several new regulations aiming at rapid market liberalization, land privatization and natural resources marketization with major example the establishment of the Hellenic Republic Asset Development Fund.[4]

First steps towards the adoption of a 'human-in-nature' view in biodiversity conservation

The four barriers analyzed above have contributed to a plethora of policy failures and to the general weakness of Greek biodiversity conservation to positively address the complex interactions between human and non-human environment. We discuss below four main 'bridges' towards the transition from the current situation to the coupling of social and ecological sustainability (see Figure 1).

First, a shift towards understanding humans as ecosystem components should be supported by both state resources for interdisciplinary, long-term and cross-scale research projects as well as by reorganization of current academic research. These projects should explicitly address the linkages between patterns of human activities, biodiversity loss and the role of current policies and institutions and would require the establishment of wider social networks open to collaboration, innovation and learning for handling social–ecological dynamics (Olsson et al. 2007). The history of Greek conservation policy along with the small percentage of departments of state administration for nature conservation and the absence of research centres focusing in generating conservation policy-relevant knowledge have restricted the emergence of such broader networks of scientists and policy-makers. Thus, the establishment of inclusive and transparent multi-level governance processes fostering knowledge transfer between and within natural and social scientists, policy-makers, practitioners and communities (Jones et al. 2012) is a crucial first step.

Second, adaptability should be interpreted as transition to improved SESs. Given our findings, formal networks in the field of Greek biodiversity conservation are being strongly embedded in power-laden hierarchies resulting in the stabilization of a political system closed to evidence and knowledge, and particularly, to social groups who could modify institutions undermining social–ecological resilience (Alcorn et al. 2003). These conditions have offered the proper grounds for promoting perverse adaptations or interpret adaptation as a passive acceptance of the current situation. Thus, towards the fruitful adoption of key principles of adaptive governance (e.g. Folke et al. 2005), state institutes and ministries should be staffed with researchers and scientists not affiliated to the current political system as well as independent associations and local community groups. This reorganization is necessary for establishing accountable and responsible authorities that promote socially just distributions of benefits and involuntary risks, be under social control and thus having the potential to actively protect the rights of socially vulnerable groups while enhancing the adaptive capacity of society as a whole (Lebel et al. 2006).

Third, in order for power sharing, environmental justice and socially inclusive biodiversity conservation to be actively promoted the above initiatives should be based on deliberative inclusionary processes (Brown 2003b) aiming at the active participation of resource-dependent communities that so far have been largely excluded from expressing their views in Greek biodiversity conservation. Simultaneously, stronger links between them and PAs should be established (Jones et al. 2012), through the implementation of management schemes supporting local communities and helping them to share the benefits provided by PAs and surrounding zones. Towards this direction, a critical approach against the 'adoration of civil society', which in its current meta-synthesis plays a specific ideological role by deconstructing the importance of social classes and the structural conflict between them (Meiksins Wood 1998), would be necessary. In particular, we propose that research should be guided to the specific analysis of the relations of difference and power within and among social groups (Paulson et al. 2003), helping to specify the complex interactions among power relationships, private property rights, economic processes and ecological change. This could give specific information on the actual goals, costs and benefits of each project and policy by placing at the core of analyses the main question of political ecology, namely who wins and who loses from current policies. We furthermore argue that the emergence of political independent informal networks (Olsson et al. 2006) would be crucial for new opportunities. These networks already exist in embryonic form in Greece showing that interactions between social groups can skip formal procedures and networks and promote cooperation between practitioners, local people and scientists, especially during crises (e.g. Apostolopoulou and Pantis 2010).

Finally, a wider knowledge sharing concerning biodiversity conservation should be clearly supported through specific initiatives. The latter could invest on interactions of locals with natural resources given that practical activities linking humans and ecosystems are the foundation upon which a human-in-nature approach can be based (Davidson-Hunt and Berkes 2003). Currently, the dominant representations of a negative relationship between 'local' livelihoods and conservation obstructs the incorporation of local knowledge, whereas in a truly cooperative process traditional ecological knowledge can complement science in understanding human–ecosystem interactions and become a factor facilitating co-management and empowerment (Berkes 2004). The inability of many

scientists or state officials to understand nature–society interactions, due to the lack of understanding of resource-dependent communities, creates the misperception of a general alienation of humans from natural environment and of an artificial independence from natural resources. On the other hand, the active involvement of people in influencing nature through active interaction and coupling of theory and practice would be necessary for an emerging consciousness of the co-evolution of society and nature and may contribute to the creation of the conditions for radical changes (Ekers et al. 2009).

Conclusion

Current trends in ecology seem to acknowledge humans as crucial drivers of biodiversity change. These scientific findings have offered grounds for justified criticisms of contemporary society's neglect of its dependence upon nature which is, however, often equated with a denial of the necessity of humans' interaction with nature for their survival. As our analysis has shown the non-adoption of a 'human-in-nature' view in Greek, conservation has often led to the understanding of biodiversity crisis as an inherent conflict between conservation and development and ultimately between humanity and 'non-human' environment. This negative perception of the relationship between nature and society has been accompanied by a tendency to incorporate biodiversity into market functions. Thus, conservation by excluding people is still a common practice while institutions and policies are mainly responsible for environmental degradation often remain beyond critique. These paradoxes are dominant in the field of biodiversity conservation.

Political ecology and research on SESs can contribute to overcoming such dipoles by directing the focus towards a discussion beyond mechanistic interpretations of the nature–society interrelationship, revealing the adaptive nature of ecosystems as well as the politicized and power-laden character of the socio-economic systems involved in conservation. A clearer understanding of the way that dynamic socio-economic, political, institutional and ecological factors coalesce in the evolution of the nature–society relationship could build the bridges towards the emergence of interdisciplinary approaches capable of handling multiple objectives and combining adaptive understanding of socio-environmental change with a meaningful concern for sustainable, socially and environmentally equitable conservation policies. Hitherto, unpredictable cross-scale events involve interactions that might have been less surprising with the adoption of more integrative theories and practices.

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Notes

1. See also Folke (2006) for an alternative definition of a 'human-in-nature' view.
2. Currently named as Ministry of the Environment, Energy and Climate Change (MEECC).
3. Despite these perceptions, Greek governments have long avoided strict environmental controls for private producers on the grounds these would hinder development; the core Greek environmental law (1650/86) was 6 years in preparation, partly because of strong opposition from industrial interests (Pridham et al. 1995).
4. It is crucial to clarify that these new regulations have fundamentally changed conservation policy and governance in Greece but they have emerged after the research period of this paper and thus they are not being investigated here in detail.

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